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PAGOPHAGIA AND HEMOGLOBIN LEVELS  
IN PREGNANT WOMEN

by  
CONTESSA WARD

A Thesis  
Submitted in Partial Fulfillment of the Requirements  
for the Degree of Master of Science in Nursing  
in the Division of Nursing  
Mississippi University for Women

COLUMBUS, MISSISSIPPI

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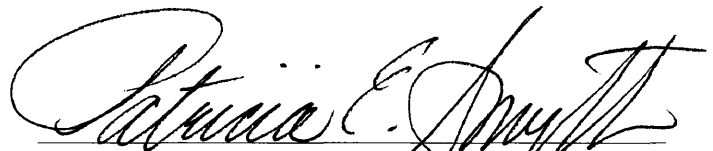
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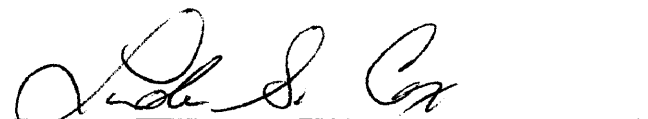
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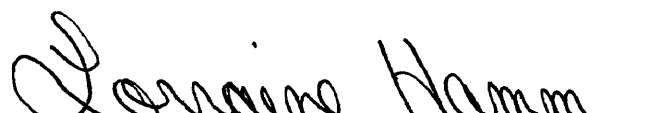
Pagophagia and Hemoglobin Levels  
in Pregnant Women

by

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## Abstract

Pica is a behavior characterized by the compulsive, persistent ingestion of non-food substances. It is a longstanding practice that has far-reaching implications for prevention and treatment. Pagophagia, or the excessive, compulsive consumption of ice, is a subcategory of pica. Although pica has been documented for centuries, there are limited studies regarding pagophagia and its effects in pregnant women. A comparative descriptive study was conducted to determine whether pagophagia is related to hemoglobin levels during pregnancy. Becker's Health Belief Model was utilized as the theoretical framework. Data were gathered by means of retrospective chart audit. The hypothesis was there would be no difference in the hemoglobin levels of pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia. The sample included 100 pregnant women, 50 women who practiced pagophagia and 50 women who did not. Students  $t$  test and descriptive statistics were

used to analyze the data. The hemoglobin levels were significantly ( $p < .001$ ) lower in pregnant women who practiced pagophagia. The researcher, therefore, rejected the null hypothesis. In this sample, ethnicity had no relationship to pagophagia. No other variables were discovered to be significant in the practice of pagophagia. Findings implied that health care providers should routinely assess all pregnant clients for pica and should carefully monitor hemoglobin levels in women experiencing the phenomenon. Recommendations include replication of the study using a prospective design in various geographic locations and among ethnically rich cultures.

## Dedication

This research project is dedicated to my mother,

MARY HELEN WARD

I thank God for having blessed me with a  
wonderful parent. Words could never express the  
love and gratitude I have for you. Thank you.

## Acknowledgments

This research could not have been accomplished without hard work, words of encouragement, and determination. I would like to express my gratitude to the members of my research committee, Dr. Patsy Smyth, Lorraine Hamm, and Dr. Linda Cox, for their time and suggestions contributed to this research project. Your expertise and kindness will never be forgotten.

I would like to thank my family for their encouragement and support throughout this year. This would not have been possible without your help. I love you all.

There were so many special people standing behind me that I would like to express my appreciation, Develon, Latonya, Lakeshia, and Jan, only to name a few. To the many more whom I did not name, thank you.

I would like to give thanks to the Lord. Without Him, none of this would have been accomplished. He moved me when I thought I could not be moved. Lord, I owe this all to you. Thank you.



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## Chapter I

### The Research Problem

One of the most puzzling behaviors of humans is pica. Pica is an eating disorder manifested by a craving or oral ingestion of a given substance that is unusual in kind and or quantity (Moore & Sears, 1994). There is little consistency in defining pica. Compulsive behavior and craving are two terms used consistently in defining pica. Crosby (1976) described pica as the compulsive eating of anything. According to Zamula (1985), the term pica refers to the compulsive behavior, not to the substance or substances that the person craves.

The word pica derives its name from the Latin word for magpie (genus *Pica*), a bird known for its ravenous appetite for diverse substances. Names for many specific forms of pica have been derived from the Greek words for the ingested substance and the Greek phagein which means, "to eat" (Moore & Sears, 1994, p. 390). Pica can take the form of a variety of substances. The more common forms of pica ingestion are ice (pagophagia), laundry and

cornstarch (amylophagia), dirt or clay (geophagia), and lead paint chips (plumophagia).

The underlying cause of pica is not known. According to Federman, Kirsner, and Federman (1997), cultural, psychological, physiologic, and nutritional theories exist to explain the etiology of pica. Historically, pica has occurred during times of famine or when individual diets lack certain nutrients or have heightened demands for adequate nutrition, such as during growth or pregnancy. Diets low in trace elements, such as iron and zinc, are often associated with pica. Poverty and poor nutrition can contribute to the onset of pica. In some cases the consumption or ingestion of unusual substances is more likely to be the cause of some disorder rather than the disorder causing the consumption (Crosby, 1976). According to Federman et al. (1997), pica is associated with a variety of disorders and can lead to life-threatening complications. Pica has been associated with iron deficiency, zinc deficiency, and developmental and mental deficiencies.

According to Elliot (1968), women have laid claim to numerous cravings during pregnancy for centuries. These women were predominantly inhabitants of our southern

states. According to Lacey (1990), pica appears to be more common in infants, young children, pregnant and nursing women, African Americans, psychotics, and the mentally retarded. Though typically associated with pregnant women, pica is a nondiscriminating condition. The focus of this research is to further explore pica, particularly pagophagia, in the pregnant population.

#### Establishment of the Problem

Anyone can fall victim to pica. What that person craves is limited only by the imagination. This study focused primarily on the form of pica called pagophagia. Pagophagia is the excessive craving or ingestion of ice. It is among the most "normal" of the substances labeled as pica. Pagophagia is considered to be so similar to normal eating practices that it is among the least studied (Lacey, 1990). Elks (1994) alluded to the fact that most researchers in Europe view pagophagia as a pathologic behavior. However, in the Southern United States, eating ice is considered normal, especially during hot weather. Although documentation of pica has occurred for centuries, Edwards et al. (1994) suggested that information regarding the psychosocial and dietary factors related to pagophagia are meager. Parry-Jones (1992) presented a historical

review of information about concerns of pagophagia dating as far back as the time of Hippocrates and Aristotle.

According to Elks (1994), pagophagia is usually regarded as a pathological behavior and is evidence of an iron deficiency state. Although the relationship between pagophagia and other forms of pica is unclear, persons with iron deficiency usually present with a new onset of pagophagia. Crosby (1976) conducted a study in which 50% of patients with iron deficiency anemia exhibited pica, with the majority demonstrating pagophagia. Coltman (1969) and Reynolds, Binder, Miller, Chang, and Sherman (1968) established that pagophagia, common with iron deficiency, can be corrected with iron therapy.

Pica in pregnancy has often been treated as more a curiosity than a potential medical problem. Such a perception has been reinforced by a general feeling that pica is uncommon and that there is a lack of hard evidence for consistent complication association (Horner, Kolasa, Lackey, & Warren, 1991). However, according to a report conducted by Horner et al. (1991), pica is shown to be a prevalent condition in pregnancy, affecting one fifth of high-risk women. According to Horner et al., women at high

risk for pica are black, live in rural areas, and have a positive family history of pica.

Horner et al. (1991) noted that most studies focused on estimating the prevalence of pica practices in pregnancy. The authors also noted that the most common outcomes in mothers with pica were anemia, iron deficiency, and toxemia. Poor functional status, prematurity, perinatal mortality, and low birth weight are outcomes that occur with fetuses and infants associated with mothers who practice pica.

The true picture of pica may be difficult to obtain due to the suspected reluctance of pregnant women to discuss pica behaviors. "Pica humiliates its victim" (Crosby, 1976, p. 2765). Family and friends are aware of the practice and may even be amused by it, but the victim tries to conceal it from society and medical personnel (Crosby, 1976). Because most clinical practices advise women to stop their pica practice, only limited descriptions of pica practice and its effects in pregnant women exist (Horner et al., 1991). Therefore, the problem addressed in this study was pagophagia and hemoglobin levels in pregnant women.



### Significance to Nursing

The study of pica as it relates to hemoglobin levels in pregnant women has significance to nursing in a variety of areas. Significance is discussed in the areas of nursing research, education, and practice.

Scant research has been conducted regarding pica in pregnancy. Findings from this study lend understanding to unusual cravings in pregnant women and their relationship to anemia, a common problem in pregnancy. As nurse practitioners assume greater responsibility for the care of pregnant women, the importance of empirical study regarding the clinical significance of pica needs to be conducted by nurses.

Nurses at all levels of entry into the profession are exposed to pregnant women and the phenomenon of pica. Yet most nursing curricula describe the occurrence of pica without addressing its significance in client management. Findings from this study may contribute important data to nursing curricula in terms of client characteristics that need to be monitored in the presence of pica.

Knowledge about pica may be more vital to client health management than current empirical evidence suggests. In addition to malnutrition, pica may have an

impact on hygiene, infection control, and risk of personal injury. Although the focus of this study was on the relationship between pica and hemoglobin levels in pregnant women, many of the additional findings may stimulate the development of nursing interventions relevant to the many possible ramifications of pica. Nurse practitioners, in particular, are often positioned to screen for pica and to observe for any damage to the clients that might result from this unusual habit. Any empirical relationships determined through the conduction of this study would help nurse practitioners know which medical and demographic variables to examine in the clients with pica.

### Theoretical Framework

The theoretical framework for this study was Becker's Health Belief Model (Janz & Becker, 1984). This model, which has a phenomenological origin, focuses on how to promote preventive health behaviors. The model centers on an individual's perception of health and how the perception may lead to possible health-seeking behaviors. Becker conceives that a person's health beliefs and the expression of those beliefs could explain a person's actual health practices. General aspects of the model

include an individual's perception of the illness, perceived susceptibility, and understanding the severity of the illness (Janz & Becker, 1984).

The Health Belief Model affords a theoretical foundation from which health-related behaviors may be depicted and altered. The Health Belief Model suggests that preventive health behavior is influenced by several factors. These factors are perceived susceptibility to an illness, perceived severity of an illness, perceived barriers to performing the recommended health action, perceived benefits of performing the recommended health action, and cues to action. Cues to action may be internal or external. Some cues to action may include information acquired from the media, health care professionals, friends or family members, and present or past illnesses (Janz & Becker, 1984).

Pagophagia in pregnancy should highlight the need for dietary assessment and counseling. Pregnant women should understand the benefits to themselves and their infants, which result from a healthy, appropriate diet during pregnancy. Health care professionals should understand the health outcomes of pica and be more proactive for clients about potential risks and benefits related to pica.

Without solid evidence that pica produces a substantial health risk, many pregnant women with immense unusual cravings may not perceive any susceptibility to illness from pica. If clients perceive no risks, then barriers to proceeding with pica related activities do not exist for them. Conversely, research-based teaching about pica risks could be a strong cue to action to stop behaviors stimulated by pica cravings.

### Assumptions

The assumptions identified for this study were as follows:

1. Many pregnant women experience and report pica or pagophagia.
2. Health care providers document pica or pagophagia in patients' medical records.
3. An individual's perceptions influence his or her health status and compliance with recommended health actions.

### Purpose of the Study

The purpose of this study was to determine if a difference existed in the hemoglobin levels of pregnant women who practiced pagophagia as compared to pregnant

women who did not practice pagophagia. This finding is useful to the advanced practice nurse whose ultimate goal is health promotion.

#### Statement of the Problem

Pica is the pathologic craving of substances not commonly regarded as food or the unusual craving for normal food substances. Studies reveal pica can occur anywhere and is not limited to any age, sex, or racial group. Though currently in the United States pica is believed to occur primarily in the African-American population of the rural South, it is also documented and exists in the Caucasian population of the same area. Pica is considered to be potentially harmful in pregnancy based on reports of fetal and maternal toxicity and other maternal complications (Smulian, Motiwala, & Sigman, 1995). However, little published data exist on pagophagia and the physical effects pagophagia has on pregnancy. Therefore, the problem addressed in this study was pagophagia and hemoglobin levels during pregnancy.

#### Research Hypothesis

One research hypothesis guided this study: There will be no difference in the hemoglobin levels of pregnant

women who practice pagophagia as compared to pregnant women who do not practice pagophagia.

#### Definition of Terms

For the purpose of this study, the following terms were defined and operationalized:

Hemoglobin levels: Theoretical: Hemoglobin level is part of a complete blood count. The normal range in females is 12.0 to 16.0 g/dl. A level lower than 11 g/dl constitutes anemia. Operational: Hemoglobin concentrations abstracted from a complete blood count from study participants' medical records. Hemoglobin levels were adjusted for smokers according to guidelines provided by the Centers for Disease Control.

Pregnant women: Theoretical: females who carry a viable fetus for a period of approximately 28 to 40 weeks which results in the birth of living infant. Operational: females who are between the ages of 15 and 45 years and gave birth to a living infant after 28 to 40 weeks of pregnancy.

Pagophagia: Theoretical: Pagophagia is a subcategory of pica. Pica, which derives its name from the Latin word for magpie, can take the form of a craving for a variety of substances; therefore, pagophagia is the excessive

craving or consumption of ice or ice counter parts.

Operational: any consumption or craving of ice or ice components as documented in the study participants' medical records.

### Summary

Pica, or the ingestion of nonfood substances, is a complex phenomenon that is poorly understood and often difficult to resolve. When problematic, pica requires a multifaceted intervention from medical, social, and nursing personnel over an extended period of time. While pagophagia, or ice pica, is well documented among pregnant women, little empirical data exist addressing pica during pregnancy and whether the phenomenon has a substantial relationship to anemia and other complications of pregnancy. This research study focused on pagophagia during pregnancy.

In this chapter, the researcher sought to establish the practice of pagophagia as a relevant research problem and relate it to the advanced practice nurse. The Health Belief Model served as the theoretical framework for this study. Assumptions, purpose of the study, problem statement, research question, and key terms were described

in order to further elucidate significance of the current research.



## Chapter II

### Review of the Literature

Relatively little knowledge exists regarding the relationship between pagophagia and hemoglobin levels during pregnancy. The current researcher conducted a literature review in the areas of pica, pagophagia, and nutrition in order to gain a broader perspective from which to examine the current research problem.

According to Smulian, Motiwala, and Sigman (1995), causes and risk factors for pica are not well established. These investigators sought to characterize the prevalence of pica in a rural obstetric population. Also examined were patterns of pica practices, social and economical influences, and the dispositions of the population toward the unusual practice.

Using Becker's Health Belief Model as a framework, the researchers examined concepts relevant to the study including how an individual's biological, psychological, and sociocultural characteristics and total life experiences influenced the way that person behaves and

practices. Smulian et al. suggested that "there are four general categories of etiologic hypotheses for pica including psychologic, pharmacologic, cultural, and nutritional" (Smulian et al., 1995, p. 1239). These theories overlapped systemically.

For the purpose of the study, key terms, such as hematocrit level, anemia, pica ingestion, and women ingesting pica, were defined. Only women consuming nonfood substances were considered to have pica. Anemia was defined as a hematocrit value of  $< 32\%$ . Ice ingestion, as a form of pica, was included only as a persistent, compulsive consumption if attained from uncommon sources.

Smulian et al. (1995) utilized a prospective study design. The sample was a nonprobability convenience sample of pregnant women ( $N = 125$ ) from a rural health department in Georgia who presented for care over a consecutive 4-month period. The sample consisted of 58% African Americans, 38% Caucasians, 3% Hispanics, and 1% Asians. Participants' ages ranged from 12 to 37 years, and their weights ranged from 105 to 309 pounds.

Data were collected by licensed personnel on an initial prenatal visit through physical exams, nutritional and dietary evaluations, interviews, and questionnaires.

Statistical analysis included utilization of the chi-square and t tests with an alpha p of  $< .05$ . The incidence of anemia, patient characteristics, and the prevalence of pica were examined during the analysis of data.

Smulian et al. (1995) discovered no significant differences in pica or non-pica groups related to age, race, weight, or gestational age. Of the 125 participants, 18 reported pica practices (13 African Americans and 5 Caucasian). Ice ingestion was the most common form of pica reported (44.4%). Other pica ingested included clay, laundry starch, and soap (18.7%). Although frequency of ingestion was difficult to capture, the greatest amount of ice ingested was 5 pounds per day with clay ingestion at one half to one pound per week. "Anemia was found in 3 women with pica and in 19 women without pica ( $p > .05$ )" (Smulian et al., 1995, p. 1237).

Reasons for pica also were identified. Thirty-three percent characterized pica as a "craving," 11.1% as a habit, 11.1% believed it was beneficial to them, and 44.4% did not know why they consumed nonfood substances. Attributes of patients with pica encompassed cravings, pica before pregnancy, childhood pica, and the presence of other household members with pica.

Smulian et al. (1995) suggested that a substantial portion (14.4%) of rural pregnant women practice pica. Nevertheless, this group may be difficult to identify based on traditional risk factors of race, age, and anemia. The researchers' findings also indicated that a variety of pica substances ingested still need to be identified and studied in order to make meaningful conclusions regarding potential complications associated with pica.

Smulian et al. (1995) acknowledged that more research is needed to address instances of pica in rural southern populations as well as in urban northern populations regarding the nutritional status of patients with pica, pregnancy outcomes, and pregnancy complications. The current researcher sought to explore the pagophagia segment of Smulian et al.'s research by further investigation of the relationship of ice consumption to hemoglobin levels in southern, mostly rural, women.

In another study involving pregnant women, Rainville (1998) cited many risk factors associated with unfavorable pregnancy outcomes. These unfavorable outcomes were suggested to be a result of uncommon dietary practices such as pica. Rainville sought to establish the prevalence

of pica during pregnancy and the effects of pica practices on anemia, infant birth weight, preterm birth, and maternal hemoglobin levels at delivery.

Pica, ice pica, and ice-freezer frost pica were key terms in this study. Pica was defined as a craving for, and ingestion of nonfood substances, such as laundry starch, clay, dirt, or ice. Ice pica was defined as the ingestion of one cup or more of ice cubes, crushed ice, or shaved ice on four or more occasions during pregnancy. Ice-freezer frost pica was defined as ice pica and the ingestion of any amount of freezer frost on four or more occasions during pregnancy. "The frequency of pica was defined so that subjects who had an isolated instance of pica would not be classified as having pica" (Rainville, 1998, p. 294).

A retrospective cohort study was conducted using 281 eligible subjects from a cross-sectional survey. The initial nonprobability convenience sample included 366 women who were interviewed over a 4-month period. Participants were 16 to 30 years of age at the time of delivery, English speaking, qualified for special supplemental nutrition program for Women, Infants, and

Children (WIC) and had infants younger than one year of age.

Rainville (1998) conducted this study of pica at four WIC clinics in Houston and Prairie View, Texas. Data were collected by one of six trained interviewers. The interviewer examined pica practices, demographic, and lifestyle variables. WIC records and hospital medical records were used to obtain health information, such as cigarette, alcohol, and or drug use, hemoglobin levels, hematocrit levels, gestational age, and birth weight of infants. The hemoglobin levels and hematocrit values for smokers were altered according to guidelines set by the Centers for Disease Control and Prevention.

Statistical analyses included analysis of variance, regression analysis, chi-square tests, and orthogonal t test. Mean standard deviations were also presented. Demographic data, means of groups, and prevalence rates were examined during the analysis of data.

Ice ingestion was discovered to be the most prevalent form of pica (53.7%). Other forms of prevalent pica were ice-freezer frost (14.6%) and clay, laundry starch, baking soda, cornstarch, baby powder, or dirt (8.2%). Of the 281 participants, 215 reported pica practices. Most

participants who reported pica were African American, high school graduates, single, and aged 20 to 25 years at delivery.

There was no significant difference in pica or non-pica groups related to anemia ( $p > .05$ ); the ice pica group had the highest prevalence of anemia (27.1%) during pregnancy as compared to the non-pica group with the lowest prevalence rate (20.4%). Rainville (1998) found that women with pica were significantly more likely to smoke during pregnancy than women without pica ( $p < .05$ ). There were no significant differences in pica or non-pica groups as related to alcohol and drug use.

Through further data analysis, Rainville (1998) established there were significant differences between pica and non-pica groups related to hemoglobin levels ( $p < .01$ ). The mean standard deviations for hemoglobin levels were ice pica ( $114 \pm 12$  g/L), ice-freezer frost pica ( $110 \pm 13$  g/L), other pica ( $113 \pm 12$  g/L), and non-pica ( $118 \pm 11$  g/L). "Maternal hemoglobin level at delivery was a statistically significant predictor of gestational age in a univariate regression ( $p = .04$ )" (Rainville, 1998, p. 295). The researcher detected a trend to near significant between ice pica and other pica groups

( $p = .06$  and  $p = .09$ , respectively) related to maternal hemoglobin at delivery. Ice-freezer frost pica was found to be a significant predictor ( $p = .001$ ) of low hemoglobin levels at delivery. No association emerged when comparing the variables of pica and birth weight or gestational age.

When compared to other studies, Rainville (1998) found a much higher incidence of ice and ice-freezer frost pica. Anemia was often detected in the ice pica group. Rainville concluded that the ice-freezer frost pica group had the lowest hemoglobin levels at delivery and the highest prevalence of drug and alcohol use. The other-pica group had the highest prevalence of smoking. The non-pica group had the lowest prevalence of anemia and the highest hemoglobin levels at delivery.

Rainville (1998) suggested that pica use is associated with lower maternal hemoglobin levels at delivery. The findings also indicated that pica was not associated with pregnancy outcomes. The researcher asserted that women who practice pica should be informed regarding possible health risks. The investigator acknowledged that future research is needed to examine pica in relation to nutrition, attributes, and pica relationships to substance abuse.



Continued research regarding pica in pregnancy was recommended as vital to health education and primary preventive care with the pregnant client. The current researcher sought to expound upon the knowledge provided in the Rainville research by investigating pagophagia during pregnancy and its relationship to hemoglobin levels.

In an earlier study, Edwards et al. (1994) proposed that practices of pica and the clinical effects of pica had not been adequately documented. Thus, the researchers sought to describe the practice of pica, biochemical data associated with pica, and pregnancy outcomes in an urban population.

For the study, pica was defined as the self-reported craving or compulsive ingestion of nonnutritive substances, such as clay (geophagia), starch (amylophagia), and ice or freezer frost (pagophagia). "The self reported craving was for one substance which was consumed regularly in unusual quantities" (Edwards et al., 1994, p. 954S).

Edwards et al. (1994) used a prospective observational method to conduct the study. The nonprobability sample included 553 African-American women

who were pregnant at the time of admission to one of three prenatal clinics located in Washington, DC. The participants' ages were between 16 and 35 years. All subjects in the study granted informed consent before participation.

Data were collected by trained African-American interviewers and by the project pediatrician at different times throughout the study. A comprehensive entry questionnaire was administered initially, focusing on usual food habits, food cravings, and ingestion of nonfood substances. A second research instrument was utilized to evaluate psychosocial variables, such as support systems or stress and anxiety factors. Other data, such as pregnancy outcomes and pregnancy complications, were abstracted from the participants' medical records. In vitro methods were also used to collect biochemical and hematological data.

Edwards et al. (1994) found that of the 553 study participants 45 (8.1%) reported pica ingestion. The most common picas reported were ice (3.8%), freezer frost (3.1%), and starch (1.4%). Clay (geophagia) pica was not reported in this sample. The frequency and amount of

ingestion were reported to be one half to 2 cups a day from 1 to 7 days a week.

According to Edwards et al. (1994), reasons provided for pica ingestion were cravings, appeal, and tastefulness of the substance. Engagement in pica during youth and the observation of others, such as mothers, pregnant women, and relatives, were other reasons presented for pica.

Edwards et al. (1994) discovered no significant difference in the nutrient intakes of pregnant women who practiced pica to pregnant women who did not practice pica. The mean serum ferritin values were significantly lower in pica-practicing women as compared to non-pica-practicing women ( $p = .000$ ). The researcher found that mean serum ferritin values also were significantly lower in women with ice or freezer frost than those with non-ice freezer frost. Mean corpuscular hemoglobin concentrations were significantly lower in pica women than those of non-pica women ( $p = .017$ ). The same relationship occurred between women with ice-freezer frost pica and women with non-ice freezer frost pica. "The serum folate concentrations of infants delivered to women who stated that they consumed nonfood substances and those who craved freezer frost were significantly lower than those of

non-pica women and of women who did not crave freezer frost ( $p = .029$ )" (Edwards et al., 1994, p. 959S).

Autonomic ratings were higher in infants born to women with pica than in infants born to women without pica ( $p = .002$ ). The latter also was true for ice or freezer frost pica and non-ice freezer frost pica study participants ( $p = .003$ ). Head circumferences of infants born to mothers who practiced non-food and freezer frost pica were significantly lower than those born to mothers who did not practice pica ( $p = .013$ ). "There were no differences in gestational age, body length, or birth weight in infants delivered to pica versus non-pica or women who craved or did not crave freezer frost" (Edwards et al., 1994, p. 960S).

Edwards et al. (1994) suggested that iron deficiency might be a result of pagophagia due to faulty iron utilization. The researchers proposed that different pica practices might elicit different responses and explanations.

The researchers acknowledged the need for more research pertaining to pica and its practices. The current researcher met these recommendations by studying pagophagia and hemoglobin levels during pregnancy. From

the review of literature, the researcher noted the need for continued research regarding pagophagia and pregnancy. The current researcher sought to expand on the knowledge provided by further investigating the effect of pagophagia on pregnancy.

In an attempt to fill the gap in the literature on nutrition and pregnancy outcomes, Johnson et al. (1994) conducted a prospective observational study that examined maternal prenatal dietary intakes and anthropometric measurements and their relationship to pregnancy outcomes. Using a purposive sampling design, the researchers selected 322 subjects between the ages of 16 and 35 years from several prenatal clinics in the Washington, DC area. Subjects were nulliparous and free of diseases such as diabetes mellitus, sickle cell, thalassemia, and hemoglobin C.

Data collection occurred at different times throughout the study. Demographic data were collected during an entry-level interview. Dietary information was obtained monthly from quantitative 24-hour dietary recall. Data obtained from subjects' medical records included maternal anthropometric measurements such as pregnancy weight and measures of height and delivery weight.

Pregnancy outcome data were obtained after delivery by the project pediatrician.

Statistical analysis was done utilizing Pearson correlations, student t tests, multiple regression analysis, and one-way analysis of variance. Descriptive statistics also were utilized to compile data.

The mean dietary intakes of protein, vitamins A, C, and B<sub>12</sub>, thiamin, riboflavin, and niacin all exceeded the 1998 Recommended Daily Allowances (RDA) while the mean dietary intake of food energy, vitamin B<sub>6</sub>, folate, calcium, iron, magnesium, and zinc was below the 1989 RDA. Dietary intake of protein, vitamins A and C, thiamin, riboflavin, niacin, vitamin B<sub>12</sub>, and phosphorous when expressed as percentages was above 100%, while those for food energy and the remaining nutrients were below 100. Although mean weight gain for the sample was 28.3 pounds, 44.4% of the subjects had a pregnancy weight gain below the lower recommended limit. Six and four-tenths percent of the newborn infants had low birth weight (below 2500 g). "Mean infant birth weight, length and gestational age for the entire sample were all within normal ranges" (Johnson et al., 1994, p. 939S).

Johnson et al. (1994) found no significant difference in food energy and nutrient intakes and the birth weight of infants. The researchers concluded that there were no significant correlations between food energy and nutrient intakes and pregnancy outcome measures. There were significant correlations between maternal anthropometric measurements and pregnancy outcomes. The researchers identified statistically significant relationships between sociodemographic variables, maternal prenatal dietary intakes, anthropometric measures, and pregnancy outcomes.

Johnson et al. (1994) concluded that maternal anthropometric measurements foretell pregnancy outcomes better than prenatal dietary intake. The researchers suggested that prenatal diet had an influence on maternal weight and birth weight in women who are undernourished. Therefore, results of the study by Johnson et al. (1994) had implications for the current study because the current research sought to examine pagophagia and hemoglobin levels during pregnancy.

Fairburn, James, and Stein (1992) conducted a study to describe changes in eating that occur during pregnancy with a focus on cravings and aversions. A sample of 100 primigravid women who were free of physical illness and

had no history of medical treatment known to influence body morphology was studied utilizing a prospective design. Participants were interviewed on two separate occasions utilizing a standardized assessment interview.

The Eating Disorder Examination was the standardized tool utilized by the researchers to measure the clinical features of eating disorders. A computerized data system also was utilized to obtain data on the course and outcome of each pregnancy.

Eighty percent of the subjects reported aversions to specific foods, drinks, and smells. Most common aversions reported were coffee (34%), tea (14%), the smell of fried or fatty foods (15%), the taste of spicy foods (10%), and the presence of cigarette smoke (8%). The taste of the coffee and tea made the two more aversive than their smell.

Fifty-three participants had specific dietary cravings. "The most common substances craved were chocolate (14%), citrus fruits (11%), savory foods such as pickles (9%), potato chips (7%), and ice cream (7%)" (Fairburn et al., 1992, p. 668). The researchers reported that the cravings were often exaggerations of previous ones. Pica, including ingestion of charcoal and frozen



vegetables, was reported by several subjects who reported they found those substances inviting and tasteful.

The researchers asserted that the cravings were in part a response to pregnancy-induced alterations in taste and smell. Fairburn et al. discovered that there were no significant differences between the occurrences of nausea, vomiting, aversions, and cravings and the degree of eating disorder psychopathology. There were no significant differences established between perinatal state (gestation, birth weight, APGAR score, and birth complications) and labor complications to aversions and cravings.

Fairburn et al. (1992) acknowledged the theoretical and clinical importance of studying pregnant clients due to the possible health-altering effects nutrition may have on pregnant women and fetuses. The study conducted by Fairburn et al. had implications for the current study because both are concerned with dietary intakes and their effect on pregnancy.

In summary, the cited studies documented the prevalence of dietary aversions and cravings and their effect on the pregnant client. Yet little empirical evidence exists. The current researcher sought to add to

the body of research available hoping to bridge the gaps in the existing literature about pica, pagophagia, and hemoglobin levels during pregnancy.

## Chapter III

### The Method

The lack of empirical evidence regarding the effects pica has on the pregnant female and unborn fetus impedes preventive practice and education for the advanced practice nurse. The purpose of this study was to determine if a difference existed in the hemoglobin levels of pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. In this chapter, the methods, including the design, setting, sample, and instrumentation used to conduct this study, are described.

#### Design of the Study

A descriptive comparative design utilizing a retrospective chart audit was employed for this study to establish whether or not a difference existed in the hemoglobin levels of pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. A descriptive design can be used to observe, describe, and document differences in two groups that

occur naturally in a setting. A comparative design was utilized because comparison designs provide a basis for interpreting results (Polit & Hungler, 1999).

#### Setting, Population, and Sample

The setting for the study was a rural prenatal clinic located in a northeastern county in Mississippi. The state of Mississippi is bordered on the north by Tennessee, on the east by Alabama, on the south by the Gulf of Mexico and Louisiana, and on the west by Louisiana and Arkansas. According to the 1990 census, Mississippi had 2,573,617 inhabitants (U.S. Bureau of Census, 1999). Caucasians made up 63.5% of the population, and African Americans comprised 35.6%. In the early 1990s, services and manufacturing provided more jobs and income than any other economic activity in Mississippi ("Mississippi," 1998).

The county in which the clinic was located covered approximately 460 square miles and included several small towns and one city of 35,000 in its catchment area. The population of the county, according to the 1990 census, was approximately 72,300. According to the United States Census Bureau (1999), an estimated 10,155 people of all ages in the county live in poverty. The median household income for the county is \$31,350. The clinic was chosen

because it employs nurse practitioners as its primary care providers and serves a large accessible population of pregnant women.

The targeted population for this study was all females between the ages of 15 and 45 years living in north Mississippi who gave birth to a live infant between 28 and 40 weeks gestation. From the total population of prenatal records at the clinic that belonged to clients aged 15 to 45 years and gave birth to a living infant after 28 to 40 weeks of pregnancy, a final sample of 100 charts was selected for review. Of the 100 charts selected, 50 of the clients practiced pica ingestion, and 50 clients did not practice pica ingestion.

#### Method of Data Collection

Procedures. Permission to conduct the study was obtained from Mississippi University for Women Committee on the Use of Human Subjects in Experimentation (see Appendix A). The researcher telephoned the office manager of the prenatal clinic to obtain initial consent for this research study. A letter of consent was then mailed to obtain formal permission (see Appendix B). A personal visit was made to the clinic where the clinic staff members were acquainted with the research study through

the provision of information by the researcher. Staff then were informed of the need for their participation in the compilation of medical records for the study. Staff members were reassured that all information would be kept confidential and that participation in the study would in no way affect their job or job responsibilities.

On the day of data collection, the staff personnel obtained medical records utilizing a random selection of charts based on criteria described from the total population of client charts. The researcher reviewed each chart using the researcher-designed Chart Review Form (see Appendix C). The researcher utilized an empty room while abstracting information from the medical records. Information obtained was stored under lock and key with researcher access only.

Instrumentation. The instrument utilized for the study was the researcher-developed Chart Review Form that provided space for recording pagophagia and beginning hemoglobin levels in pregnant women. The review form also contained spaces for demographic data, hemoglobin levels at different times during pregnancy, reports of pagophagia or pica, and the outcome of pregnancy as documented in the medical records.

### Data Analysis

Student's  $t$  tests were employed in order to analyze data. The  $t$  test is the basic parametric procedure for testing differences in group means (Polit & Hungler, 1999). Descriptive statistics were utilized to examine the information obtained from the chart review form. Descriptive statistics are used to describe and summarize data (Polit & Hungler, 1999).

### Summary

In Chapter III, the researcher described the method utilized by the researcher to determine the difference in the hemoglobin levels of pregnant women who practiced pica and the hemoglobin levels of pregnant women who did not practice pica. The research method including sampling technique, data collection and analysis, design, and instrumentation were presented.

## Chapter IV

### The Findings

Pica is a longstanding practice that has far-reaching implications for treatment and prevention. The purpose of this study was to investigate pagophagia and hemoglobin levels during pregnancy. In this chapter, a detail description of the sample and results of data analysis are presented.

#### Description of the Sample

A final sample of 100 charts was utilized in this study. Fifty of the participants practiced pagophagia and 50 participants did not. The sample consisted of individuals whose ages ranged from 15 to 30 years with a mean age of 21 years. Ethnic background represented two categories: Caucasian (50%) and African American (50%). Forty-eight percent of the pregnant women who practiced pagophagia were Caucasian (see Table 1).



Table 1

Sample Characteristics of Ethnicity Expressed by Frequency and Percentage

Race	f <sup>a</sup>	%
Caucasian		
Pagophagia group	24	48.0
Non-pagophagia group	26	52.0
African American		
Pagophagia group	26	52.0
Non-pagophagia group	24	48.0

<sup>a</sup>N = 100.

Additional demographic data were ascertained from the chart review form. The participants' height ranged from 58 inches to 72 inches with a mean height of 64.4 inches. The sample consisted of primigravid to multigravid women (see Table 2).

Table 2

Sample Characteristic of Gravid Expressed by Frequency and Percentage

Gravida	f <sup>a</sup>	%
1	52	52.0
2	23	23.0
3	17	17.0
4	3	3.0
5	4	4.0
7	1	1.0

<sup>a</sup>N = 100.

Ninety-eight percent of the subjects had term pregnancies with the remaining 2% in the pica group having preterm births. One of the 100 births resulted in complications for the infant. One of the 100 pregnant participants suffered complications at delivery.

Results of Data Analysis

Data were collected to test one research hypothesis. Descriptive statistics and t test were used to analyze the data. The null hypothesis for the study was as follows: There will be no difference in the hemoglobin levels of

pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia. Data were abstracted for hemoglobin levels at the beginning of pregnancy, 28 weeks, and 36 weeks for pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. There was no significant difference in the hemoglobin levels of pregnant women who practiced pagophagia ( $M = 12.066$ ) as compared to pregnant women who did not practice pagophagia ( $M = 12.434$ ) at the beginning of pregnancy,  $t(98) = -1.610$ ,  $p = .111$ . The hemoglobin levels at 28 weeks gestation for pregnant women who demonstrated pagophagia ( $M = 10.934$ ) and pregnant women who did not demonstrate pagophagia ( $M = 11.722$ ) were significantly different,  $t(98) = -3.472$ ,  $p = .001$ . Hemoglobin levels were significantly lower at 28 weeks for women who practiced pagophagia. There also was a significant difference in the hemoglobin levels at 36 weeks for pregnant women who practiced pagophagia ( $M = 10.532$ ) and pregnant women who did not ( $M = 11.722$ ) (see Tables 3 and 4). Thus, the researcher rejected the null hypothesis. The hemoglobin levels also were significantly lower at 36 weeks in pregnant women who practiced pagophagia.

Table 3

Comparison of Hemoglobin Levels in Pica and Non-Pica Group by Mean and Standard Deviation

	Group			
	Pica		Non-Pica	
Hemoglobin level	M	SD	M	SD
Initial	12.7	1.2	12.4	1.1
28 weeks	10.9	1.1	11.7	1.7
36 weeks	10.5	1.1	11.8	0.9

Note. N = 100.

Table 4

t Table Describing Hemoglobin Levels in the Pica and Non-Pica Groups

Hemoglobin level	df	MD	t	p
Initial	98	- .37	-1.61	.110
28 weeks	98	- .79	-3.47	.001*
36 weeks	98	-1.31	-6.62	.001*

Note. N = 100.

\*p < .05.

There were no significant differences in birth weight and head circumferences in infants delivered to women who practiced pagophagia as compared to women who did not practice pagophagia,  $p = .634$  and  $p = .436$ , respectively. There also were no significant differences in pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia as related to age, race, or height. In this study there were no significant differences in pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia as related to smoking, alcohol, and drug use (see Table 5).

Table 5

t Table Describing Age, Height, Race, Smoking, Alcohol, Drug Use, Birth Weight, and Head Circumferences in Pica and Non-Pica Groups

Variable	df	MD	t	p
Age	98	-0.44	- 0.57	.57
Height	98	.00	0.00	1.00
Race	98	-4.E-02	- 0.40	.70
Smoking	98	6.E-02	0.79	.43

(table continues)

Table 5 (continued)

Variable	df	MD	t	p
Alcohol	98	-4.E-02	-1.43	.16
Drug	98	-2.E-02	-1.00	.32
Birth weight	98	1.88	0.48	.63
Head circumference	98	-0.24	-0.78	.44

Note. N = 100.

\*p < .05.

### Summary

Descriptive statistics and t test were used to analyze data presented in Chapter IV. Data analysis revealed significant differences in the hemoglobin levels of pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. Findings revealed no difference in the age, height, or race of pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. There also was no significant difference related to smoking, alcohol, or drug use in pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia.

## Chapter V

### The Outcomes

Pica is a medieval Latin word meaning magpie. The phenomenon has presented a dilemma for health care providers for centuries. It has been noted that pica satisfies hunger sensations in women whose diet is poor in nutrients. Yet little evidence exist in the medical literature regarding the effects of pica on the pregnant woman or her fetus. Thus, a descriptive comparative study design was utilized to examine pagophagia, a form of pica, and hemoglobin levels in pregnancy. Becker's Health Belief Model provided the theoretical framework for this study. The null hypothesis that guided the study stated that there will be no difference in the hemoglobin levels of pregnant women who practice pagophagia as compared to pregnant women who do not practice pagophagia. A retrospective chart audit utilizing a researcher-developed chart review form was utilized to collect data. Outcomes of the study are presented in this chapter.

### Summary and Discussion of Findings

The ages of the participants ranged from 15 to 30 years. The mean age of the participants was 21 years. The sample included 100 participants, 50 pregnant women who practiced pagophagia and 50 pregnant women who did not practice pagophagia. Of the women who practiced pagophagia, 48% were Caucasian. Two of the 50 pagophagia practicing pregnant women had preterm labor without any complications for the mother or infant.

The demographic findings of this research study were similar to Smulian et al.'s (1995) findings in which no significant difference related to age, race, or gestation age was discovered. The current researcher also found no significant differences among pregnant women who demonstrated pagophagia as compared pregnant women who did not practice pagophagia in relation to age, race, height, gestational age, or birth weight. Similarly, Edwards et al.'s (1994) research revealed no significant differences in gestational age or birth weight in infants delivered to women who craved or did not crave freezer frost. Edwards et al.'s (1994) findings differed from the current researcher's findings pertaining to the head circumference of infants. Edwards et al. discovered that the head



circumferences of infants were significantly lower in ice pica group than in the non-pica group. The current researcher discovered that there was no significant difference in the head circumferences of infants born to pregnant women who practiced pagophagia as compared to pregnant women who did not practice pagophagia. Reasons for the differences in these findings are fertile ground for future research. A significant difference was discovered in the hemoglobin levels at 28 weeks and 36 weeks gestation between pregnant women who practiced pagophagia and pregnant women who did not practice pagophagia. These findings are similar to the research findings for both Edwards et al. and Rainville's (1998) research studies. Rainville (1998) concluded that the ice-freezer frost pica group had lower hemoglobin levels at delivery than the non-pica group.

Johnson et al. (1994) conducted a study that observed maternal prenatal dietary practices and their relationship to pregnancy outcomes. Johnson et al. (1994) concluded that there was no significant difference in food energy and nutrient intakes in birth weight of infants and pregnancy outcomes. This study is similar to the current research in which there was no significant difference

found in head circumferences, birth weight, complications for the mother, or complications for the infant. There were only two documented preterm births identified in the pagophagia group in the current study. These births did not result in any complications.

Horner et al. (1991) and Lacey (1990) are among many who suggested that pica is a culturally-based phenomenon found primarily in the African-American population. Findings from the current study differed significantly from previous research outcomes. In this research the practice of pagophagia occurred equally in both Caucasian and African-American participants. This information suggests that further studies are warranted to validate the outcome. In both Horner et al. (1991) and Lacey (1990) there was a bias based on the ethnic availability of the subjects.

#### Implications for Nursing

This research study was conducted to examine the relationship of pagophagia and hemoglobin levels during pregnancy. Knowledge of a relationship between pagophagia and a decreasing hemoglobin level will provide the advanced practice nurse with understanding regarding the effect unusual cravings and consumption of ice have on

pregnancy. Implications are suggested for the areas of nursing research, education, theory, and practice.

Nursing research. Little recent empirical data exist regarding pica in pregnancy. Findings from this study help to bridge the gap regarding the effect pica has on hemoglobin during pregnancy, but further exploration is needed to find potential reasons for and attributes of clients who practice pica or pagophagia. Due to the paucity of recent literature, additional research studies are needed to establish supportive data relative to health care practices of the pregnant client and to determine what modifying factors motivate these clients to participate in positive health-promoting behaviors.

Nursing education. Advanced practice nursing programs need to enhance curricula to include different aspects of pica that are observed and possibly overlooked in the primary care setting. Currently most curricula only depict pica as a problem for the indigent African-American population, but this research has revealed these characteristics are present in the Caucasian population as well. Therefore, pica practices should receive more emphasis in schools of nursing.

Nursing practice. Nurse practitioners in the primary care setting are responsible for assessing and screening for pica practices. Nurse practitioners should consistently ask all their patients about pica regardless of ethnicity with each visit. Nurse practitioners are also in a unique position that allows them to implement education programs regarding the results and consequences of pica. Knowledge about pica is vital to client health management, especially to the pregnant client as documented in the current research. Pica practice may have detrimental effects on the patients in the areas of nutrition, safety, and well-being. Any empirical relationship established with pica research can add to the existing body of knowledge for nursing. Nurse practitioners can assist pregnant patients to improve or begin health-promoting practices.

Nursing theory. Becker's Health Belief Model was a relevant framework within which to focus on how to promote preventive health behaviors. Becker's Health Belief Model served as the theoretical framework, which guided this research concerning pagophagia practices of pregnant clients. According to the Health Belief Model, the individual's perception of illness may coordinate or

initiate health-promoting behaviors. The findings of this study suggest that the practice of pagophagia can have a negative effect on hemoglobin levels, thereby increasing the risk for problems in the pregnant client. Theory-based teaching about pagophagia or pica could stimulate health-seeking behaviors in the pregnant client.

### Conclusions

There were a number of conclusions based on the findings of this research study. The conclusions are as follows:

1. Pregnant women who practiced pagophagia had statistically significant lower hemoglobin levels at 28 weeks and 36 weeks than pregnant women who did not practice pagophagia.
2. Pagophagia was not restricted to African Americans but was also discovered in the pregnant Caucasian population equally.
3. Pagophagia had no statistically measurable effect on pregnancy outcomes in this study.

### Limitations of the Study

One limitation of the study was that no data were available about exactly how much ice was consumed or not

consumed by each participant. There was also no documentation of what week of pregnancy the participants started the pagophagia behavior. This study was limited to one pregnancy clinic in the rural South; therefore, the ability to generalize findings was limited. The instrument was researcher-developed and has not been previously used in empirical research.

#### Recommendations for Further Research

Based on the findings of this research study, the following recommendations are made:

1. Implementation of a study using a prospective design in various geographic locations and ethnically rich cultures.
2. Replication of this study to include the amount of ice consumed by participants and when consumption started.
3. Implementation of a study to identify personal attributes and attitudes of pregnant women who practice pica.
4. Implementation of a prevention study focusing on consequences of pagophagia and ways to prevent it.

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APPENDIX A

APPROVAL OF MISSISSIPPI UNIVERSITY  
FOR WOMEN'S COMMITTEE ON USE OF  
HUMAN SUBJECTS IN EXPERIMENTATION



MISSISSIPPI  
UNIVERSITY  
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April 26, 2000

Ms. Contessa Ward  
P. O. Box W-910  
Campus

Dear Ms. Ward:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research conditionally with the requirement that you keep the records secure and under lock and key. In addition, the consent form should be executed by the head of the clinic or agency and not the office manager.

I wish you much success in your research.

Sincerely,

Sheila V. Adams, Ed.D.  
Interim Vice President  
for Academic Affairs

SA:wr

cc: Mr. Jim Davidson  
Dr. Patsy Smyth

APPENDIX B

LETTER REQUESTING PERMISSION  
TO CONDUCT STUDY

634 West Main #12  
Tupelo, MS 38801  
April 20, 2000

Jenean Smith, CFNP  
Healthy Start Pregnancy Clinic  
810 Garfield Street  
Tupelo, MS 38801

Dear Ms. Smith,

My name is Contessa Ward. I am a graduate student in the Family Nurse Practitioner Program at Mississippi University for Women. I am conducting a research study in partial fulfillment of a Master of Science in Nursing degree. The study I plan to undertake is entitled Pagophagia and Hemoglobin in Pregnant Women. I am requesting your assistance and written permission to conduct my research in your clinic.

A retrospective chart review will be utilized to collect the needed information. Any information gathered will be kept strictly confidential. The record information gathered will be stored under lock and key with researcher access only.

I am enclosing a duplicate of this letter for your records. Please return the signed original to me in the enclosed envelope. If you have any questions, please call me at (662) 842-2409. Thank you for your time and consideration.

Sincerely,

Contessa Ward, RN

-----  
☐ Permission granted  
☐ Permission denied

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature of Participant

APPENDIX C  
CHART REVIEW FORM

## Chart Review Form

1. Age:\_\_\_\_\_
2. Height:\_\_\_\_\_
3. Race
- ☐ a. African American
  - ☐ b. Caucasian
  - ☐ c. Native American
  - ☐ d. Hispanic
  - ☐ e. Other. Please specify:\_\_\_\_\_
4. Number of pregnancies:\_\_\_\_\_
5. Number of children:\_\_\_\_\_
6. Hemoglobin results
- ☐ a. Initial
  - ☐ b. 5<sup>th</sup> month
  - ☐ c. Delivery
7. Pica practice
- ☐ a. Pagophagia
  - ☐ b. Other pica practice
  - ☐ c. Non-pica practice
  - ☐ d. Prior to pregnancy
  - ☐ e. Only during pregnancy
8. Outcome of pregnancy
- ☐ a. Term
  - ☐ b. Premature
  - ☐ c. Infant birth weight (lbs)\_\_\_\_\_
  - ☐ d. Infant head circumference
  - ☐ e. Complications of mother
  - ☐ f. Complications for infant
9. Other practices
- ☐ a. Nonsmoker
  - ☐ b. Smoker
  - ☐ c. Alcohol use
  - ☐ d. Drug use
  - ☐ e. Any alterations in above use while pregnant